

NON-PUBLIC?: N
ACCESSION #: 9303300220
LICENSEE EVENT REPORT (LER)

FACILITY NAME: James A. FitzPatrick Nuclear Power Plant PAGE: 1 OF 06

DOCKET NUMBER: 05000333

TITLE: Low Intake Level Scram
EVENT DATE: 02/25/93 LER #: 93-004-00 REPORT DATE: 03/26/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Mr. Paul McGuire, Senior Licensing TELEPHONE: (315) 349-6362
Engineer

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

EIIS Codes are in !

On 2/25/93 at 0130 hours with the plant operating at 100 percent power, operators observed condenser SG! inlet temperature to be 58F (lake temperature was 33F). The increased temperature was apparently caused by a buildup of ice on the plant intake bar racks which restricted flow from the lake to the screenwell NN! intake. 80 of 88 intake bar rack heaters were operating. The screenwell water was being tempered by returning circulating water discharge to the intake where it mixed with lake water. As the ice blocked the intake, the amount of water flowing in from the lake decreased which caused the ratio of tempering water to lake water to increase. This caused the circulating water inlet temperature to increase. Load was reduced to 70 percent power and one circulation water pump was tripped. At 0140 hours, when the screenwell level was noted to be approximately ten feet below normal level, the reactor was scrammed.

A second circulating water pump was removed from service and the screenwell level returned to near normal. Computer alarm points have been established to alarm whenever the screenwell or condenser inlet temperature increases by 5 degrees F per hour. A continuous water level watch has been posted and an abnormal operating procedure has been developed to provide guidance if symptoms of icing conditions are observed.

END OF ABSTRACT

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EIIS Codes are in !

Event Description

On February 25, 1993, at 0100 hours, the plant was operating at 100 percent power. At 0130 hours, the operators reduced power to 70 percent when the circulating water inlet temperature was observed to be 58 degrees F. At 0140 hours, with the plant operating at 70 percent power, a scram was initiated by taking the reactor mode switch out of the run mode when the screenwell water level was observed to be approximately ten (10) feet below normal. The decreased screenwell level was due to apparent partial plugging of the cooling water intake structure bar racks with ice.

The sequence of events leading up to and immediately following the scram is presented below:

February 25, 1993:

0000 hours - Normal plant operation at 100 percent rated power. Condenser SG! inlet temperature (after tempering with some discharge water) was 37F.

0100 hours - Condenser inlet temperature had increased to approximately 40F.

0125 hours - Electric Fire Pump 76P-2 started automatically on low fire header pressure (105 psig). Forebay water level had decreased to the point where the Fire Header Jockey Pump (76P-3) lost suction momentarily, resulting in a fire header pressure decrease.

Between 0130

and 0135 hours - Electric Fire Pump 76P-2 was shutdown locally after verification of normal fire header pressure by an operator that had been dispatched to the area.

- Control Room operators noted condenser inlet temperature was 58 degrees F.

- Control Room operator noted an increase in circulating water system (CWS) pump motor amperage (which is consistent with decreased suction pressure).

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- Fire Pumps 76P-1 and 76P-4 started automatically on low fire header pressure at 95 psig and 85 psig respectively.

- Load reduction to 70 percent power to allow a reduction in cooling water demand was initiated.

0138 hours - Circulating Water Pump 36P-1C was shutdown. This reduced the total cooling water demand by approximately 30 percent

0140 hours - The operator dispatched to the fire pump and screenhouse area reported water level in the forebay area was an estimated 10 feet below normal. The shift supervisor directed that a manual scram by inserted. No actual measurement of forebay water level was made. Scram was initiated when the mode switch was taken out of run with more than 15 percent power as sensed by the Average Power Range Monitors (APRMs) IG!.

0143 hours - Condenser inlet temperature peaked at approximately 67F. Two circulating water system pumps and two normal service water pumps continued in operation as the Control Room personnel were executing Abnormal Operating Procedures (AOPs) for the Reactor Scram.

0153 hours - Operator noticed that Reactor Mode Switch was not completely in shutdown position. Operator placed mode switch to shutdown position -

reactor scram.

0210 hours - Forebay water level had increased to approximately 6 feet below normal (approximately 1 foot above the minimum fire pump suction level). Two Circulating Water Pumps and two Normal Service Water Pumps continued in operation.

0213 hours - Circulating Water System Pump 36P-1A was shutdown by the operator. One Circulating Water Pump and two Normal Service Water Pumps continued in operation. Total cooling water flow was approximately 40 percent of the pre-event flow.

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0215 hours - Forebay water level had increased to approximately one foot below normal.

Between 0215 and 0430 hours - Fire Jockey Pump 76P-3 was returned to service to maintain normal fire header pressure of approximately 140 psig. Jockey Pump 76P-3 operation appeared to be normal and Fire Pumps 76P-1, 76P-2 and 76P-4 were restored to automatic start.

0430 hours - Forebay water level normal.

Although the water level in the screenwell had decreased below the minimum required level for the fire protection pumps, the water level did not drop below the minimum required water level for the safety related Emergency Service Water BI! and Residual Heat Removal Service Water BI! pumps.

Cause of the Event

The scram was manually initiated due to low screenwell intake level which was apparently caused by ice blockage of the intake structure. The cause for the partial intake blockage has been determined to be ice formation due to environmental conditions. The intake had become partially blocked by either: 1) frazil ice forming either around or in front of the heated intake bar racks, or 2) slush ice present in front of the bar racks.

On the night of February 24 to February 25, 1993, the meteorological conditions were such that formation of frazil ice or slush ice at the intake was possible based on the environmental conditions. The night sky was clear, the ambient temperature was below freezing (11F), lake temperature was approximately 33F, there was a steady wind throughout the day. These conditions are required to form frazil ice. The frazil ice is formed on the surface of the lake due to the radiant heat removal from the water. Winds and wave action drive the frazil down into the water. Once below the surface, the frazil follows currents and will buildup on the intake bar racks either by nucleation (if the bar racks are below freezing and the water is subcooled) or by accretion or by both processes. Ice accretion is expected to be the dominant process. Another possibility is slush ice in the area was carried to the intake by water currents and adhered to the

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intake bar racks. The ice formation around or in front of the intake bars partially blocked the flow of water into the plant. This blockage reduced the ability of the intake to meet the CWS pump flow requirements which caused the level in the screenwell intake to drop until the CWS pumps were secured. With one CWS pump secured, the percentage of intake area left open was large enough to allow two CWS pumps to operate and the screenwell intake level to slowly increase. Securing the second CWS pump allowed water level to rapidly increase.

Analysis of Event

The intake structure supplies water to the Circulating Water System (CWS), Normal Service Water (SWS), Emergency Service Water (ESW), Residual Heat Removal Service Water (RHRSW), and Fire Protection Systems. The event is significant because had operators not recognized the low water level problem and not secured the CWS pumps, the water level in the screenwell could have dropped below the minimum required water level for the ESW and RHRSW pumps. The ESW and RHRSW pumps are required to mitigate the effect of a Design Basis Accident (DBA). The water level in the screenwell decreased to between elevation 236 feet and 237 feet based on the operators' observations; at this elevation the ESW and RHRSW pumps would have been able to perform their safety function if called upon. The fire protection pumps started automatically on low header pressure and they were run with inadequate suction head for approximately 12 minutes. The remaining pumps are not safety related.

The event requires a report under 10 CFR 50.73 (a)(2)(iv). That is, a condition that resulted in the manual actuation of the Reactor Protection System.

Corrective Action

1. Two computer alarm points have been established to identify any 5 degree circulating water (condenser inlet) temperature change over a one hour time interval to provide the operators with an early indication that ice blockage may be occurring at the intake. This will provide the operators additional time to respond prior to the condition worsening to the point where a plant scram would be required.
2. An Abnormal Operating Procedure (AOP-64) has been written to provide guidance to operators when a low screenwell level is observed or upon receiving the circulating water temperature change alarm.

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3. A surveillance has been written to establish requirements for monitoring intake level and temperature to assess environmental conditions in order to determine the probability for the formation of frazil ice.
4. Administrative requirements have been established to station a continuous screenwell water level watch stander during the period of November 15 through April 15 when lake temperature is below 35 degrees F. The water level watch requirement will be removed once a modification is installed that provides the Control Room with an alarm on low screenwell level.
5. Water level indicators have been installed on the screenwell intake wall upstream of the trash racks and in the B Emergency Pump Bay. This will provide operators with a reference as to actual water level.

Additional Information

Previous Similar Event: LER-90-023 "Intake Heaters Potentially Inoperable Due to Control Room Fire" described a forced manual plant shutdown due to cooling water intake forebay traveling waterscreens being blocked with debris. No previous events of intake structure blockage with ice has occurred.

ATTACHMENT 1 TO 9303300220 PAGE 1 OF 1

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New York Power Harry P. Salmon, Jr.
Authority Resident Manager

March 26, 1993
JAFP-93-0165

United States Nuclear Regulatory Commission
Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

SUBJECT: DOCKET NO. 50-333
LICENSEE EVENT REPORT: 93-004-00 - Low Intake Level Scram

Dear Sir:

This report is submitted in accordance with 10 CFR 50.73 (a)(2)(iv).

Questions concerning this report may be addressed to Mr. Paul McGuire at
(315) 349-6362.

Very truly yours,

HARRY P. SALMON, JR.

HPS:PJM:tld
Enclosure

cc: USNRC, Region 1
USNRC Resident Inspector
INPO Records Center

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